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Science and technology for development

Report of the Secretary-General

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I. Introduction

1. In its resolution 52/184, the General Assembly reaffirmed that capacity-building in science and technology should remain a priority issue on the United Nations agenda, and urged that international cooperation efforts be intensified to strengthen developing countries endogenous capacity-building in science and technology to utilize scientific and technological developments from abroad as well as to modify and adapt them to suit local conditions. It stressed the need to strengthen the important role of the United Nations in the field of science and technology as a cross-cutting concern within the work of the United Nations, particularly through effective policy guidance and better coordination. It recognized the role of Governments in science and technology for development, in particular in providing appropriate regulatory frameworks and incentives for the development of science and technology capabilities; it also recognized the need for Governments and regional and international bodies to take measures to ensure women better access to and participation in scientific and technological areas; and, further, recognized the role of the private sector in science and technology for development, in particular in the transfer and development of science and technology capabilities. In this regard, it stressed that the current forms of cooperation involving the public and private sectors of developing countries should be built upon and expanded, and also stressed the importance of identifying barriers and restrictions to the transfer of publicly and privately owned technologies.

2. It recognized that information technologies are important requisites for planning, development and decision-making in science and technology, and invited the relevant bodies of the United Nations system to assess their capability to provide assistance and promote cooperation in the area of information and communications technologies.

3. It emphasized the importance of the activities that are to be pursued within the framework of the Commission on Science and Technology for Development, including a broad spectrum of new global challenges in science and technology as contained in the Commission's common vision; reaffirmed that the substantive theme for the inter-sessional period 1997–1999 of the Commission would be "Science and technology partnerships and networking for national capacity-building"; and requested the Secretary-General to submit a report to the Assembly at its fifty-fourth session on progress in the implementation of the resolution.

II. Implementation of science and technology for development: aspects of General Assembly resolution 52/184

4. The present report, prepared pursuant to General Assembly resolution 52/184, covers the activities falling within the mandates of the Commission on Science and Technology for Development and its supporting secretariat within the United Nations Conference on Trade and Development (UNCTAD). The main strands of these activities comprise work on science and technology science partnerships for national capacity-building; biotechnology and its impact on development, with particular emphasis on food production; the formulation of a common vision regarding the future contribution of science and technology for development; information and communication technologies; science, technology and innovation policy reviews; gender, science and technology; the coalition of resources; and cooperation and coordination of the science and technology-related activities of the organizations of the United Nations system.

III. Science and technology partnerships and networking for national capacity-building

5. Since the late 1980s, the world economy has been undergoing fundamental changes driven by the rapid globalization of economic, scientific and technological activities, and characterized by the emergence of knowledge-intensive production and of competition based on price as well as non-price-based factors, such as innovation. The new competitive environment has fuelled the growth of knowledge-intensive production by increasing scientific and technological interactions, which in turn have led to an acceleration in the pace at which new ideas are generated. To face up to the challenges of this new environment, new forms of inter-firm cooperation, including networking and partnering, have evolved. Such interactions have over the past few years become a more and more popular way of conducting business and transferring technology and the basis for local capacity-building in many countries. These developments have created an urgent necessity to adjust policies and practices at both the firm and government levels.

6. The growth of partnering and networking, however, has until very recently been largely confined to firms in the

developed countries, and increasingly in the newly industrialized countries in Asia and Latin America. Firm-level studies in a wide variety of developing countries show that many firms from East and South-East Asia have succeeded in making large strides in high-technology sectors not only by investing heavily in both human and physical resources but also by forming partnerships with more technologically advanced firms from the North. Anecdotal evidence from success stories in those countries suggests that partnerships have helped firms in those countries to build the technological capabilities and skills needed to penetrate international markets. Given that the process of partnerships and networking relates to the continuing debate on appropriate policies for economic integration and growth in an increasingly global and knowledge-based economy, the recent upsurge in these inter-firm interactions deserves the attention of policy makers, and calls for greater analysis of the dynamics and implications of this process at both the national and international levels.

7. It is in this context that the Commission on Science and Technology for Development decided to adopt "Science and technology partnerships and networking for national capacity-building" as the main theme for its fourth inter-sessional period, 1997–1999, and to address the subject at its fourth session, in May 1999. The Commission set up the Working Group on Science and Technology Partnerships and Networking for Capacity-Building to review the evidence concerning the implications of partnering and networking, in particular the extent to which they have opened up new opportunities for developing countries and countries in transition to build up indigenous capacity and technological capability, and to make policy recommendations for the consideration of the Commission. In accordance with Economic and Social Council recommendations (see Council resolution 1997/62), special emphasis was to be placed on partnerships and networking in the fields of biotechnology and energy.

8. In carrying its task, the Working Group sought inputs from and collaborated with several United Nations agencies and other institutions with competence in partnering and networking. In particular, UNCTAD, the Department of Economic and Social Affairs, the Economic and Social Commission for Western Asia (ESCWA), the United Nations University/Institute for New Technologies (UNU/INTECH), the World Health Organization (WHO), the Open University of the United Kingdom, the University of Cape Town and the Centre for International Science and Technology of Washington, D.C., made significant contributions to the work of the Working Group.

9. The Working Group agreed that partnerships and networking could: (a) be effective mechanisms for technological development, national capacity-building and market access across a large number of industries; (b) be vehicles, particularly for small and medium-sized enterprises, to learn new business and management cultures and to access international markets; provide firms and research institutions from developing countries and countries in transition with opportunities to leverage their own research and development activities and enable them to build the credibility necessary to attract the attention of potential partners abroad. However, it was stressed that partnerships and networking, while important, could not be expected to be a panacea for all the problems on the road to economic development. There was overall recognition that developing countries and countries in transition continue to face certain constraints in their efforts to advance in technology transfer and cooperation, and that Governments have a crucial role to play in fostering networks and partnerships.

10. The Working Group suggested that additional work was needed to develop guidelines and case studies based on lessons learned and best practices from the wide variety of available experiences of networking and partnerships already under way.

11. On the recommendation of the Commission following its consideration of the report (E/CN.16/1999/2) and recommendations of the Working Group at its fourth session, the Economic and Social Council, in its resolution 1999/61:

(a) Recommended that developing countries and countries with economies in transition identify, in cooperation with all stakeholders: (i) priority areas for the development of technological capacity, where international partnerships and networking could play an essential role; (ii) the major needs of domestic firms in terms of technology, expertise and know-how in order to map out clear objectives, expected output and monitoring tools; and (iii) useful services that could be provided to foreign public and private institutions interested in forming partnerships with domestic public and private institutions, and that could help in establishing more equitable and balanced partnerships;

(b) Recommended that Governments explore ways and means of fostering partnerships among public and private institutions, *inter alia*, by creating an enabling policy, regulatory and legal environment, and by contributing information and knowledge, financing the development of research and development activities and infrastructure, and raising public awareness of the role and benefits of partnerships and networking in science and

technology, and recommended that where such processes already exist, they should be updated;

(c) Recommended that Governments support partnerships and networking for both basic and applied research with a view to enhancing national capacity-building;

(d) Requested the secretariat of the Commission, using the resources it can mobilize, to: (i) identify and analyse best practices in partnering and networking, and (ii) build an inventory of opportunities for international science and technology partnerships and networking;

(e) Invited Governments, the public and business sectors, academia and non-governmental organizations in industrialized countries to engage in partnerships and networking in science and technology with their counterparts in developing countries and countries with economies in transition in order to facilitate access to and the use and adaptation of new technologies, and to improve their technological capability and build national capacity;

(f) Recommended that given the extent of the burgeoning energy demand and the financial constraints in developing countries, partnerships and collaboration on renewable as well as on conventional sources of energy, such as those envisaged in the clean development mechanism and the joint implementation arrangements envisioned in the context of the Kyoto Protocol, be increased in order to (i) promote capacity-building in developing countries; (ii) provide modern energy services to rural and unserved urban populations; and (iii) encourage private sector participation in the provision of electricity supplies under innovative arrangements, such as build-operate-transfer or build-operate-own schemes;

(g) Recommended that the Commission collaborate more closely with United Nations bodies and specialized agencies of the United Nations, in particular UNCTAD, the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Industrial Development Organization (UNIDO), the United Nations Development Programme (UNDP), the World Bank, the World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO) and the World Intellectual Property Organization (WIPO), to promote science and technology partnerships;

(h) Recommended that the least developed countries, particularly those in Africa, should support their effective integration into the global process of mobilization of scientific knowledge and available technology, especially by (i) supporting all initiatives aimed at the subregional regrouping of resources in the area of science and technology for development; (ii) identifying equitable partnerships and placing due value on their scientists; (iii) creating centres of excellence in priority areas, and enhancing local education in science and technology skills.

IV. Biotechnology and its impact on development

12. With its wide array of techniques and applications, agricultural biotechnology offers the potential for increasing and improving food production capacity and promoting sustainability. However, developing countries are deriving only limited benefits from it owing to declining public sector investments in agricultural research and development and to the dominant role that multinationals and the private sector currently play in biotechnology. The global seed trade is dominated by large private industry giants whose vast economic power and commercial control over plant germplasm is beginning to overshadow the role of the public sector in plant breeding and other agricultural research in many countries. Strong and restricted protection mechanisms of biological resources have made biotechnology less accessible, and this has led to serious inequities between developed and developing countries.

13. In an attempt to shed more light on this and other issues, the Commission on Science and Technology for Development was called to organize a panel meeting during the inter-sessional period, 1997–1999, with a view to identifying issues relevant to development that were not sufficiently covered by existing forums and to recommend for the consideration by the Commission at its fourth session, in May 1999, how further work on those areas might be undertaken (see Economic and Social Council resolution 1997/62).

14. The Panel reviewed the opportunities offered by biotechnology for food production, but emphasized also the need to consider the potential in diverse areas, such as pharmaceuticals, the exploitation of marine resources and combating deforestation. Developing countries faced a number of impediments in their development of biotechnology. Lack of clearly defined national policy on biotechnology, limited manpower and the prevalence of economic and social problems were identified as the main reasons. Two issues of broad concern in biotechnology were the potential loss of biodiversity as a result of adoption of a limited number of high-yield varieties and the issue of bio-safety, in particular the impact of the release of genetically modified organisms (GMOs) into the

environment. Additional information and a database covering a wider spectrum of GMOs were needed in order to better understand both the pattern of development and the possible implications of GMOs. The broader socio-economic impacts of new biotechnology also needed to be better understood, including the potential limitations posed by intellectual property rights on the transfer of biotechnology to developing countries.

15. On the recommendation of the Commission following its consideration of the report and recommendations of its Panel on Biotechnology for Food Production and its Impact on Development (see E/CN.16/1999/3) at its fourth session, the Economic and Social Council, in its resolution 1999/61, decided that the substantive theme of the Commission for the inter-sessional period 1999–2001 would be "National capacity-building in biotechnology", with particular attention to agriculture and the agro-industry, health and the environment. The theme would include human resource development through basic science education, research and development, as well as their interdisciplinary aspects; the transfer, commercialization and diffusion of technology; increasing public awareness and participation in science policy-making; and bio-ethics, bio-safety, bio-diversity, and the legal and regulatory matters affecting these issues to ensure equitable treatment. The council also:

(a) Recommended that the Commission on Science and Technology for Development, through its secretariat, initiate a dialogue involving the private and the public sectors, non-governmental organizations and specialized biotechnology centres and networks, such as the Global Forum on Agricultural Research, with a view to fostering the exchange of information and ideas among scientists, policy makers, representatives of industry and end users. Such a dialogue could also provide a forum in which to raise issues concerning global developments in biotechnology (such as intellectual property rights, bio-safety, bio-ethics, pharmo-foods and "terminator" genes) and to raise public awareness and create better understanding of the potential benefits of biotechnology and other critical issues;

(b) Recommended that Governments in developing countries and countries with economies in transition undertake, with the cooperation of the international community, the following strategies:

(i) Strengthen research capability, build national capacity in biotechnology and undertake training programmes to provide a skilled workforce;

(ii) Identify and encourage the development of centres of competence in biotechnology in each country;

(iii) Develop and maintain partnerships with centres of excellence and networks in all countries;

(iv) Encourage linkages and interaction among public and private sectors and research and development institutions;

(v) Encourage the participation of the scientific community in policy discussions on biotechnology, bio-safety and bioethics and in increasing public understanding of the risks and benefits of this new technology;

(c) Requested the secretariat of the Commission to:

(i) Assist in identifying and disseminating balanced information on biotechnology, intellectual property rights and bio-safety;

(ii) Examine case studies of approaches to address issues related to technology, intellectual property rights and bio-safety issues in a practical, understandable and concrete way;

(d) Requested the Commission to collaborate with UNCTAD in preparing the next issue of the Advance Technology Assessment System bulletin on biotechnology for food production;

(e) Recommended that the Commission and its secretariat cooperate with other international and regional organizations active in biotechnology, such as the regional commissions, the United Nations Environment Programme (UNEP), UNIDO, FAO, the International Center for Genetic Engineering and Biotechnology, the World Bank, non-governmental organizations, and other international institutions such as the Consultative Group on International Agricultural Research, particularly to build understanding and to exchange information on bio-safety regulation and capacity-building, including through case studies on (i) partnerships in biotechnology, (ii) bio-safety, (iii) bio-ethics, and (iv) approaches to biotechnology and intellectual property rights issues.

V. Ways and means for the formulation of a common vision regarding the future contribution of science and technology for development

16. In its resolution 1995/4, the Economic and Social Council invited the Commission to give consideration to ways and means of taking advantage of the twentieth

anniversary of the United Nations Conference on Science and Technology for Development, held at Vienna from 20 to 31 August 1979, to formulate a common vision for the future contribution of science and technology for development.

17. In response to the Council's request, the Commission set up a panel on this issue which held a brainstorming meeting at Geneva in December 1996. The panel identified the following four main themes as the basis for developing a common vision:

(a) The concrete impact of science and technology on development; generic and sectoral policies;

(b) Capacity-building in science and technology, including aspects relating to conceptualization, experiences, management and the examination of new opportunities;

(c) The interaction of private enterprises, governments, academic institutions and civil society groups with science and technology for development;

(d) Assessment of international cooperation networks and work of organizations active in the field of science and technology.

18. The first of the above four issues was discussed by members of the Commission and experts at a workshop organized in Jamaica prior to the third session of the Commission. At its third session, in May 1997, the Commission examined the results of the work undertaken with a view to formulating a common vision, and suggestions were made concerning additional elements to be taken into account for the elaboration of a common vision. In its resolution 1997/62, the Economic and Social Council recommended that the Commission carry out a programme of preparation on a common vision as set out in the report of the panel meeting of December 1996, by holding expert group meetings. Two additional expert group meetings were held, the first at Addis Ababa on 13 and 14 November 1997, and the second at Geneva from 8 to 10 December 1998.

19. The outcome of these meetings was a succinct report synthesizing the various views expressed, which was submitted to the fourth session of the Commission for its consideration (E/CN.16/1999/4). A detailed background report of the findings of the expert groups was also made available to the Commission at its fourth session (E/CN.16/1999/Misc.4).

20. Following consideration of these reports, the Commission approved the text contained in the box as its common vision for the contribution on science and technology to development, and requested its Chairman to present that vision to the World Science Conference, Budapest 1999.

VI. Coalition of resources

21. In its resolution 1995/4, the Economic and Social Council recommended that at the international level, the work of the Commission on coalition of resources focus on specific themes and common goals among recipients, donors and international financial institutions. In its resolution 1997/62, the Council further recommended that the Commission provide a forum for exchanging views and for interaction among partners of different networks and coordination schemes in the area of science and technology for development. In response, the Commission held a meeting on the coalition of resources on information and communication technologies during its inter-sessional period 1997–1999 at Addis Ababa. The objectives of the meeting were (a) to generate dialogue among Commission members and invited experts on the concept of a coalition of resources; (b) to find out more about existing schemes for the coalition of resources in the area of information and communications technologies; (c) to examine the various channels available for networking between project managers, private sector finances and donors, including through the Internet; and (d) to develop guidelines and policy recommendations on coalitions of resources for financing the application of information and communications technologies in the areas of transmissions infrastructure, health and education. The meeting was attended by members of the Commission, United Nations agencies and donor organizations.

22. The discussions were based on three working papers, each of which dealt with one of the main themes under consideration, namely: (a) coalition of resources for the application of information and communications technologies in transmissions infrastructure; (b) coalition of resources for the application of information and communications technologies in education; and (c) coalition of resources for the application of information and communications technologies in health. In addition, presentations were made by participants in the workshop, which included Commission members, experts in information and communications and experts in policy formulation, project management and financing.

23. The examples presented in the working papers and at the workshop showed that increasingly coalitions of resources are acquiring a global dimension, with the active participation of and contributions by the private sector,

technology suppliers and global service providers. However, in order to maximize opportunities for a coalition of resources in support of science and technology for development, there is a need to, *inter alia*, balance private and social profitability in project design; design a clear and transparent national policy framework and regulatory environment, and develop the capacity to inform potential investors, lenders, donors, equipment suppliers and service providers about specific opportunities to create new coalitions of resources in a particular location or jurisdiction. The workshop felt that there was need to explore further the concept of a coalition of resources in the current global environment.

Common vision

Science and technology should be considered the common heritage of mankind. The triumphs of scientific discovery and technological innovation have greatly increased our understanding of the world we live in and the benefits we derive from it, but these benefits have been unevenly distributed across nations and within them. The process of rapid accumulation of knowledge and skills evident in some parts of the world has not reached the hundreds of millions of people still living in absolute poverty, nor has the progress of science and technology been without impact on the resources that are our common heritage. Nations must become learning societies.

We believe that one of the central issues continues to be the need to build capacity in developing countries so that they can adapt to the challenges of continuous change. In pursuing this goal, the Commission on Science and Technology for Development is committed to the common vision of an entitlement to knowledge and to the benefits of science and technology for development in the twenty-first century.

To achieve capacity-building, it is necessary to formulate explicit and coherent national science, technology and innovation policies and establish appropriate international frameworks that safeguard and protect the world's population and its resources. Individual States and the United Nations system as a whole should contribute towards this end.

An enabling political and economic environment is necessary to nurture science and technology leadership as well as to attract and retain human and financial resources for the development of science and technology.

Competitive requirements for firms everywhere in the world have also put greater pressure on Governments to become more transparent, participatory and innovative in policy design, and to pay more attention to policy coherence and to the impact of their policies on people and the environment.

In moving towards a world in which the benefits of scientific and technological change are spread more widely across society, public and private institutions will increasingly be called upon to motivate and interact with a larger and more diverse number of actors than in the past, for the process of innovation is interactive and system-wide. Strengthening systems of innovation at all levels and ensuring that their outcomes enhance general welfare will therefore require close cooperation between actors, ranging from governments at all levels and the scientific, research and development and business communities to non-governmental organizations and other segments of civil society.

The ability of economic and social actors to generate and absorb new knowledge is fundamental to the dynamic functioning of innovation systems at all levels. In the area of education, priority should be given to (a) increased investment in education, especially

engineering and science; (b) the promotion of vocational training; and (c) the improvement of the scope methodology of scientific and technological education. Collaboration with the private sector would be helpful in matching skills and needs.

New policies and services will be needed to bring women into the mainstream of technological change. The goal of universal access to basic education for all women, in view of their vital role in many aspects of society and the economy, is particularly important to the process of using and diffusing new knowledge. It will be necessary to remove the obstacles that women encounter in obtaining a university education, pursuing a career in science and engineering, and participating in the decision-making that shapes the direction of scientific and technological change and, more broadly, determines its impact on development efforts.

The world of the twenty-first century will be one in which access to knowledge is expanding and becoming less costly. Determining the accuracy and quality of information will become more difficult. As the coverage of patent and copyright protection expands ever more widely to include life forms and data banks, there is a need to raise the legitimate question of whether a proper balance is being struck between providing an incentive to invest in knowledge creation and maintaining the tradition of openness and free exchange of scientific information upon which such systems are based. It will be necessary to provide greater support for research in the public sector, particularly in the areas of health and agriculture, to encourage the further development of indigenous knowledge systems, and to increase capacities for the assimilation of transferred technology. Research institutions, however, cannot be expected to play both a long-term public research function and an entrepreneurial role aimed at short-term objectives. Experience shows that there will be a need for a mediating function in order to build linkages between the users and producers of knowledge in developing countries, where enterprises are small, their capacity to seek and evaluate information is weak and their in-house development capabilities limited. National and local Governments all have a role to play in this process, as do international educational and research networks.

Links beyond national borders are a critical vehicle for public and private institutions to acquire the knowledge and information required for development. As only a small minority of developing countries have succeeded in attracting significant inflows of foreign investment, more attention will need to be given to alternative channels for acquiring know-how from external sources, such as supplier-customer relationships, licensing, alliances, partnership arrangements, and networks for joint research and development, production and distribution. Owing to these linkages, exporting has proved a highly effective means of acquiring technological capabilities. The international community has a role to play in creating new mechanisms to support the flow of technology and in assisting developing countries in becoming more attractive both to foreign investors and to potential trade and technology partners.

To build technological and productive capabilities, greater flexibility will be needed in international trade, investment and intellectual property agreements. Developing countries should seek opportunities to promote the transfer and development of technology and take into account the social impact of technological change.

Technological innovation should be assessed in terms of its economic, social and environmental impact, with the participation of all those concerned. Among the many science- and technology-related topics about which the public has a right to be informed

and heard are climate change and the risks and benefits of advances in genetic engineering and in information and communications technologies. Scientists, including social scientists, in developing countries should have the capacity and support to carry out systematic, multidisciplinary impact analysis and risk assessment. International cooperation can be useful in providing assistance in this domain, including in building capacity in developing countries. Appropriate mechanisms to ensure adequate inclusion not only of business, Governments and the scientific community but also of groups traditionally not part of the discourse, such as non-governmental organizations, women's groups, minorities and indigenous peoples, may be needed to foster the exchange of views on the scientific, social and ethical issues of major concern.

New ways must be found so that science and technology will serve to improve, through development, the well-being of mankind in the sense of justice, equity and dignity for all peoples and in respect of future generations. The Commission on Science and Technology for Development should contribute to this process by acting as a forum for (a) the examination of science and technology questions and their implications for development; (b) the advancement of understanding on science and technology on science and technology policies, particularly in respect of developing countries; and (c) the formulation of recommendations and guidelines on science and technology matters within the United Nations system. In this context, it should also continue to assist Governments from developing countries and countries with economies in transition in reviewing the effectiveness of their systems of innovation at all levels, and by making available information on how linkages within such systems are created and sustained.

These are the challenges that will be posed by change in the twenty-first century; they are the challenges facing science and technology if it is to serve the goal of sustainable development.

24. On the recommendation of the Commission, following consideration of its secretariat's report (E/CN.16/1999/6) at its fourth session, the Economic and Social Council, in its resolution 1999/61, requested that the secretariat of the Commission, using the extrabudgetary resources already allocated for this purpose, finalize the publication of the reports on the coalition of resources for the application of information and communications technologies in transmissions infrastructure, education and health, and to ensure the widest possible dissemination of the final report.

VII. Information and communication technologies

25. In response to Economic and Social Council resolution 1997/62, in which the Council endorsed the recommendations of the Commission on information and communications technologies, there were a number of follow-up activities:

(a) With regard to the invitation by the Council to countries to prepare national strategies on information and communication technologies, several member States of the Commission reported on their information and communication technologies strategies at its fourth session, while many non-members have been providing the secretariat with written information on their Commission strategies, including their technical cooperation activities;

(b) With regard to the invitation by the Council to relevant bodies of the United Nations system to assess their capability to provide assistance and promote cooperation in the area of information and communication technologies and to suggest areas in which they would be best able to assist developing countries and countries in transition in the design and implementation of their own national information and communication technologies strategies, the UNCTAD secretariat invited the 27 United Nations agencies to communicate to it information on their assessments and prepared a synthesis report of the 22 responses received

(E/CN.16/1999/Misc.3), which was made available to the Commission at its fourth session.

26. The responses of the different United Nations bodies would appear to confirm that in the past two decades, significant efforts have been made by United Nations organizations to promote, within their own respective areas of mandates and competence, the diffusion and effective application of information and communication technologies in developing countries and countries in transition. Various forms of information and communication technologies-related activities organized within the United Nations system might be identified. Among the areas in which information and communication technologies-related initiatives were reported were the principal areas of research; the application of information and communication technologies in development programmes; advisory and training services; local capacity-building, particularly in infrastructure; software development; connectivity to global networking; and financial resources mobilization for the diffusion of information and communication technologies in developing countries and countries in transition.

27. A source book entitled *Knowledge Societies: Information Technology for Sustainable Development*, which contains the background reports of the results of the scenario-building workshop and other inputs from various research entities to the working group, was published in 1998. The book has been made widely diffused among missions at Geneva and in New York, universities, research institutions and libraries. It has also been used as background material in workshops, mainly in developing countries and countries in transition. Permission has been granted to the International Development Research Centre at Ottawa to publish abridged versions in French and Spanish, and to China's Ministry of Science and Technology to translate the work.

VIII. Science, technology and innovation policy reviews

28. Science, technology and innovation policy reviews are being undertaken by UNCTAD, in collaboration with the Commission in response to Economic and Social Council resolution 1995/4. UNCTAD is also mandated by UNCTAD IX (Midrand, South Africa, May 1996) to carry out such reviews, which are initiated at the request of member States. The need for such reviews arose from the overall consensus that the ability of a country to sustain rapid economic growth in the long run is highly dependent on the effectiveness with which its institutions and policies support the technological transformation and innovativeness of its enterprises. Developing countries and countries in transition, whose science and technology institutions are, for the most part, fragmented, uncoordinated and poorly adapted to meeting local industry's needs, also require mechanisms enabling them to assess their performance and exchange experiences in this domain. The reviews have been envisioned as vehicle for this purpose.

29. Science, technology and innovation policy reviews focus on the concept of the national system of innovation, a network of institutions, public and private, whose actions initiate, import, modify and diffuse new technologies. An important actor in the system's perspective are enterprises interacting with one another, and bringing new products, processes and forms of organization into economic use. Other important players include universities, technological institutes, research and development centres, including industry associations, institutions involved in education and training, and institutions responsible for the financing of innovations. In contrast to the traditional supply-oriented science and technology reviews, which adopted a more static approach by focusing on a description of science and technology institutions and their output, science, technology and innovation policy reviews highlight the use and value of science and technology outputs to production.

30. The first step in responding to a request from a member country for a science, technology and innovation policy review is for the United Nations Secretariat to send a brief programming mission to the country concerned in order to discuss the design and content of a background report by the participating country and select sectors for in-depth evaluation. Once the background report is completed, an international team of experts, including members of the Secretariat, prepare an evaluation report, containing the team's assessment of the science, technology and innovation system in the country, and propose appropriate policy options. In order to bring the policy reviews to the attention of the local community, a final round-table meeting is held in the country between the international experts, the Secretariat and key players in the national science, technology and innovation system. The background report, as well as the review team's report, is then compiled, edited and prepared by the Secretariat for publication.

31. The first review to be undertaken was in Colombia. It was completed in 1997 and was released in the spring of 1999 (UNCTAD/ITE/IIP/5).[1] A number of recommendations put forward by the review have already been implemented or are in the process of being implemented. Its impact on the local innovation community has been considerable. Of particular significance have been the recommendations

relating to the adoption of new innovative mechanisms for research and development financing, including: (a) the restructuring of current financing schemes for existing and additional research and development resources; (b) the transfer and allocation of sufficient resources for research and development and innovation in general; and (c) other public-sector initiatives reflected in the refocusing of public expenditures to take into consideration innovation activities and programmes. The national training agency has been restructured to incorporate training for innovation. In addition, national bodies charged with the strengthening of intermediary institutions (e.g., standards and quality control institute, business support agencies) have been briefed and advised on innovation-related science and technology policies and on how such policies can be better integrated into the institutions. The response of both the public and private sectors to this exercise has been very positive and encouraging.

32. A second review was undertaken in Jamaica in 1998. This review was also released in the spring of 1999 (UNCTAD/ITE/IIP/6).[2] It has already had a significant impact on the design of Jamaica's national innovation policy as a number of recommendations proposed by the review team have already been adopted, particularly in the information technologies sector. Eight projects covering the fields of education, technology and entertainment have been designed and are at the implementation stage. These stem directly from the review. Currently, the national commission on science and technology is considering and seeking resources pertaining to the recommendations made in the entertainment sector, particularly music, and in the agro-business sector. The national system of innovation in Jamaica is in the process of being developed, and as proposed by the review, will feature the integration of the country's national institutions.

33. Two more reviews are under way in Ethiopia and the United Republic of Tanzania. In both countries, the Secretariat is conducting an integrated investment policy and science, technology and innovation policy review at the request of the countries in question. The concept of the integrated review was inspired by the increasing recognition that investment and science, technology and innovation are at the core of the process of building and sustaining competitive advantage, be it at the firm, industry or national levels. The central objectives of the integrated review are to contribute to the strengthening of the national system of innovation within developing countries and to reinforce the contributions that foreign direct investment might make to this process. The Ethiopian review was initiated in November 1997 and is now in its final stage. In the case of the United Republic of Tanzania, two preparatory meetings were held in November 1998 and April 1999, and the Government is now completing the background report. Requests for either science, technology and innovation policy reviews or integrated reviews by several other developing countries and countries in transition, including Romania, Costa Rica, Cuba, Venezuela and Myanmar, are currently being kept on hold pending availability of resources.

34. On the recommendation of the Commission, considering the importance of exchanging experiences with science and technology policy-making, the Economic and Social Council, in its resolution 1999/61, called for a continuation of the programme of science, technology and innovation policy reviews in liaison with UNCTAD, and approved, in its decision 1999/274, the inclusion of the presentation of national reports on technology and innovation policies as a separate item in the provisional agenda for the fifth session of the Commission, in 2001. A review of UNCTAD's experience with policy reviews, including science, technology and innovation policy reviews and integrated investment policy reviews will take place at the fourth session of the Commission on Investment, Technology and Related Financial Flows of UNCTAD, in October 1999.

IX. Gender, science and technology

35. The importance which the Commission on Science and Technology for Development attaches to the gender aspects of science and technology is apparent from the fact that it was selected, at the first session of the Commission as one of its substantive themes for the 1993–1995 inter-sessional period. The working group established by the Commission to examine the gender implications of science and technology presented its findings to the Commission at its second session, in May 1995. In its report, the working group made two sets of recommendations, one directed at Governments and the other aimed at the organizations of the United Nations system. In addition, the report recommended the establishment of a gender advisory board for the duration of four years, funded by extrabudgetary resources, to ensure that gender issues were adequately addressed in future deliberations of the Commission, and to follow the implementation of its recommendations by both member States and the United Nations system. The resolution embodying these recommendations was adopted by the Economic and Social Council in July 1995 (see Council resolution 1995/4).

36. Following its creation, the Gender Advisory Board started work on identifying regional units in the developing countries which could support the formation and activities of national committees set up by Governments in line with the aforementioned Council recommendation on gender, science and technology for development. Two such units have been already identified, the first at Jakarta as a joint initiative of the Indonesian Institute for Science and the UNESCO Regional Office, and the second at Montevideo as a collaboration between the Centro de Informaciones y Estudios del Uruguay and the UNESCO Regional Office. A third is to be identified in Africa.

37. By early 1999, a memorandum of understanding setting out conditions for approval of the proposal and timetable for payments had been prepared for the Jakarta office. The proposal for the Montevideo office had to be revised to take into account the mandate of the Board and its expressed concern for the proposed secretariat to develop strong relations with other non-research groups, including non-governmental organizations, networks and the private sector. A preliminary proposal still needed to be developed for the African secretariat. At the same time, the Board decided to support formation and development of national committees on gender issues, and accordingly revised its budget in order to allocate resources for the support of such committees. The Board has agreed, in principle, to set up national committees in Romania and Egypt.

38. Other work of the Board has included the development of gender science and technology policy tool-kits and the creation of a Web site to provide information on gender science and technology policy issues (www.gateway).

39. On the recommendation of the Commission following its consideration of the note by the secretariat concerning, *inter alia*, the activities of the Board (E/CN.16/1999/7), the Economic and Social Council, in its decision 1999/275, decided:

(a) To extend the mandate of the Gender Advisory Board until 30 June 2001 in order to allow it to complete its work programme within the extrabudgetary resources allocated for this purpose;

(b) That the Bureau should consult with the members of the Commission to fill the two vacancies on the Gender Advisory Board from among the members of the Commission in order to ensure continued linkages between the Board and the Commission;

(c) That the Commission should assess, at its fifth session, the desirability of continuing the work of the Board and the potential for obtaining external resources to do so.

X. Coordination of science and technology for development

40. The Commission was given the task of coordinating the activities of the United Nations system in the area of science and technology for development and of making recommendations, if so required, on how the coordination and effectiveness of these activities could best be pursued. Pursuant to this mandate, the Commission took up the issue of coordination and cooperation in science and technology in the United Nations system at its first session, in April 1993. As a first step towards performing its coordination role, the Commission requested the Secretary-General to prepare a report for its second session on the progress achieved in coordination and cooperation of the science and technology activities of the United Nations system.

41. The subject of coordination and cooperation was taken up by the Economic and Social Council at its substantive session of 1993. In this regard, the Council requested the Secretary-General to prepare a report containing an analysis and action-oriented proposals for improving coordination mechanisms of the organs, programmes and agencies that are involved in the science and technology activities of the United Nations system (see Council resolution 1993/71). The Commission has taken up the issue of coordination and cooperation at all its subsequent sessions.

42. Following its deliberations at its first session, the Commission pursued the objective of system-wide coordination in science and technology by involving agencies in its selected substantive themes during the inter-sessional periods. While the existence of possible overlapping mandates and programmes could not be excluded, the Commission considered, nonetheless, that the purpose of coordination should be to promote the complementarities of the various activities of the system while avoiding duplication as much as possible. This approach was adopted in undertaking work on the substantive themes chosen for the second, third and fourth inter-sessional periods, namely: "Gender, science, technology and development"; "Science and technology aspects of land management"; "Science and technology for meeting basic needs"; "Information and communications technologies"; and "Science and technology partnerships and networking for national capacity-building". Several United Nations agencies contributed to the work of the Commission in these areas as well as in all other work of the Commission.

43. In its resolution 1997/62, the Economic and Social Council decided that the secretariat of the Commission should be requested to study the possibility of setting up, in

collaboration with other United Nation bodies, including regional commissions, an electronic network on their activities in science and technology for development, making the network widely accessible to science and technology institutes around. A note by the Secretariat concerning the Commission's activities and the possible network was submitted to the Commission at its fourth session (E/CN.16/1999/8).

44. In considering its role and activities regarding coordination, the Commission felt that it could enhance its role as coordinator only by demonstrating leadership in this area. Therefore, the themes chosen for its inter-sessional periods should be useful, timely and realistic. To this end, on the recommendation of the Commission, the Economic and Social Council, in its resolution 1999/61:

(a) Urged the secretariat of the Commission to continue efforts, in collaboration with other United Nations bodies, including regional commissions and the Open-ended Working Group on Informatics, to establish an electronic network linking information on their activities in science and technology for development and to build awareness of scientific developments that are particularly important for fostering economic and social development;

(b) Requested the secretariat to continue to issue the regular newsletter updating activities in the United Nations system pertaining to science and technology for development, including information on plans for and the results of the inter-sessional activities of the Commission itself;

(c) Called on the secretariat and Bureau of the Commission to identify and take advantage of opportunities to interact closely with bodies of the United Nations system in order to promote greater information exchange and coordination of activities in science and technology for development; such interaction should include participation by the secretariat in the relevant coordination meetings of the Consultative Committee on Substantive Questions/Operational Activities;

(d) Recommended that every other year a panel meeting should be held at Geneva, following which the Bureau should meet the Geneva-based delegations of member States and observers for one day to discuss with delegations the status of the inter-sessional activities of the Commission and its efforts to coordinate activities of the United Nations system pertaining to science and technology for development;

(e) Agreed to keep an item on the agenda of the Commission entitled "The functioning of the Commission on Science and Technology for Development, including its role in coordinating science and technology for development", and requested its secretariat to prepare a succinct analytical report on relevant activities within the United Nations system, including the outcome of the World Conference on Science and Technology, for consideration under this item.

Notes

[1] United Nations publication, Sales No. E.99.II.D.13.

[2] Ibid., Sales No. E.98.II.D.7.